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File Code: 3420 **Date:** October 22, 2002
Route To:

Subject: Spruce Beetle at Snowbowl Ski Area

To: Gene Waldrip, Peaks District Ranger, Coconino NF

We (Arizona Zone of Forest Health Protection) have been working with your staff silviculturist, Jim Rolf, regarding spruce beetle, *Dendroctonus rufipennis*, activity and suppression treatments at the Snowbowl Ski Area. Throughout the summer of 2002 we conducted ground surveys to identify infested spruce trees and review suppression activities. This letter summarizes survey results and observations regarding bark beetle activity in these areas. We provide a background of beetle activity, a description of the current situation, and a discussion of possible future actions.

Background

In the fall of 1999, a windstorm caused damage to spruce-fir stands on the San Francisco Peaks (**Figure 1**). The majority of this damage was in the form of causing spruce trees to blow over and was primarily within the Snowbowl Ski permit area. Spruce beetle is well known to infest trees that have been blown over. Surveys in 2000 and 2001 indicated spruce beetle activity had occurred in essentially all the wind-thrown spruce.

A survey in the fall of 2001 found several standing infested spruce. A total of 161 infested spruce trees were tallied within the blowdown area adjacent to the chairlift near Midway. These findings indicated that some of the brood developed and emerged within a one-year time span. At this time, most of the infested trees were limited to within the areas of blowdown; that is, beetles had not yet expanded to adjacent stands.

Figure 1. *Wind-caused blowdown of spruce at Snowbowl Ski area.*

Based on walk-through surveys, stands adjacent to blowdown area appeared to be moderate-high to high risk. There are numerous spruce greater than 16 inches diameter at breast height, and spruce composition and basal areas are high. This combination of stand characteristics with the presence of increasing beetle populations indicated that an outbreak was likely.

Current situation and suppression efforts

Throughout late summer of 2002, we conducted ground surveys to identify newly infested spruce trees. More than 700 infested spruce trees were identified and marked with flagging (**Table 1**). In addition, small pockets of new blowdown were discovered. Brood in many of the infested trees at lower elevations (i.e., areas F and I) had already developed to the pupa or callow adult stage, indicating that they will complete their life cycle in one year. Brood in infested trees at higher elevations were still in the larval stage, suggesting that they will have a two-year life cycle. In addition to surveying within the permit area, we ran a 2-chain wide survey in the Kachina Wilderness adjacent to the Upper Ridge ski run (W1 in **Figure 3**). Only 8 infested spruce trees were found in approximately 8 acres surveyed, indicating that most of the infestation is limited to the permit area.

Table 1. *Number of spruce beetle-infested trees and average diameter at breast height (DBH) within forested islands at Snowbowl Ski area. See Figure 3 for location of survey areas. Areas not yet surveyed are omitted from table.*

	Survey Area							
	A	C	D	E	F	G	I	TOTAL
Average DBH	18.3	21.6	22.7	20.3	16.4	19.1	16.4	19.3
Number of trees	239	71	2	25	298	42	77	754
Number of infested blowdown	26	3	0	2	11	5	0	47

In 2001, the Peaks RD contracted with the Northern Arizona Conservation Corps (NACC) to begin treating infested blowdown by limbing, bucking and scorching the outer bark with torches. Due to the narrow window of favorable weather to complete this treatment, only a small percentage of the blowdown was treated. In 2002, the District contracted NACC to treat standing infested trees by felling and peeling through the use of a "log wizard" (**Figure 2**). Removing the bark results in the cambium drying to the point of becoming a non-food resource, causing the developing brood to desiccate and die. The use of a log wizard permits a wide window of opportunity for treatment compared with burning. However, because the District did not receive funds until mid-April and because of chainsaw restrictions and then forest closures, this treatment did not begin until August. From August through September, approximately 150 trees were felled and peeled. Forested areas C, E, F, and G were partially or completely treated.

Figure 2*. Using log wizards to peel infested spruce logs at Snowbowl Ski area.*

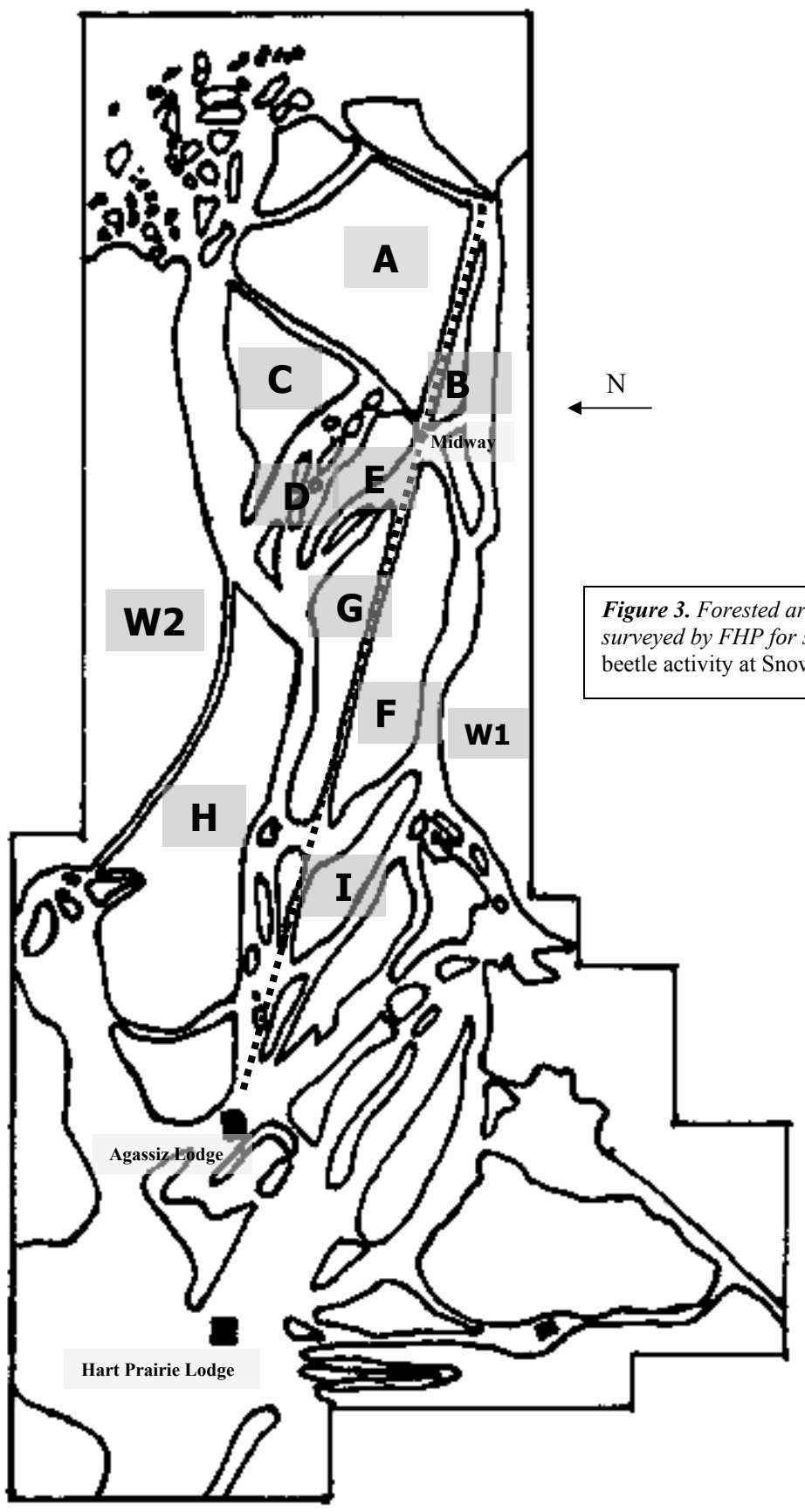

Figure 3. *Forested areas surveyed by FHP for spruce* beetle activity at Snowbowl.

Future situation

Based on the large increase in infested spruce found throughout the upper Snowbowl permit area, it is obvious that the spruce beetle population is expanding outside the initial blowdown area. Fortunately, it seems that the beetles have not spread to the adjacent wilderness at this time. We feel that the coming year may be the "make or break" time period in which either the beetle is contained within the permit area or expands to the wilderness. Spruce beetle can severely impact many forest resources and have the potential to kill up to 90 percent of spruce basal area and more than 70 percent of trees per acre in a stand over the extent of an outbreak (Dymerski et al., 2001).

Potential prevention and suppression activities were described in a site visit report filed in the fall of 2001. These activities include sanitation removal or treatment of infested trees on-site, use of semiochemicals, and use of preventive sprays. Treatments are most effective while spruce beetle populations remain low to building levels. Once beetle populations reach epidemic levels, management options become limited and less effective. Sanitation removal of infested trees, in combination with semiochemical treatments, has been demonstrated to reduce overall spruce mortality in Utah (Bentz and Munson, 2000). It is important to remember that bark beetle suppression and prevention treatments generally take several years to complete. Therefore, additional surveys and treatments will likely be necessary beyond FY 2003. Because brood are developing faster at lower elevations, these areas should be treated as soon as weather permits in the spring of 2003.

Funds may be available for FY2003 from Forest Health Protection for suppressing spruce beetle populations at the Snowbowl Ski area. Requests for these funds should be in no later than October 18, 2002. If you have any questions regarding my assessment of current bark beetle activities within the project area, its potential effect on residual standing trees, or my recommendations, please let me know. I can be reached at (928) 556-2074.

/s/ Joel D. Mcmillin
JOEL D. McMILLIN
Entomologist, Forest Health, Arizona Zone

REFERENCES CITED

Bentz, B.J. and A.S. Munson. 2000. Spruce beetle population suppression in Northern Utah. Western Journal of Applied Forestry. 15: 122-128.

Dymerski, A.D., J.A. Anhold, and A.S. Munson. 2001. Spruce beetle (*Dendroctonus rufipennis*) outbreak in Engelmann spruce (*Picea engelmannii*) in central Utah. Western North American Naturalist 61: 19-24.